

FIG.1

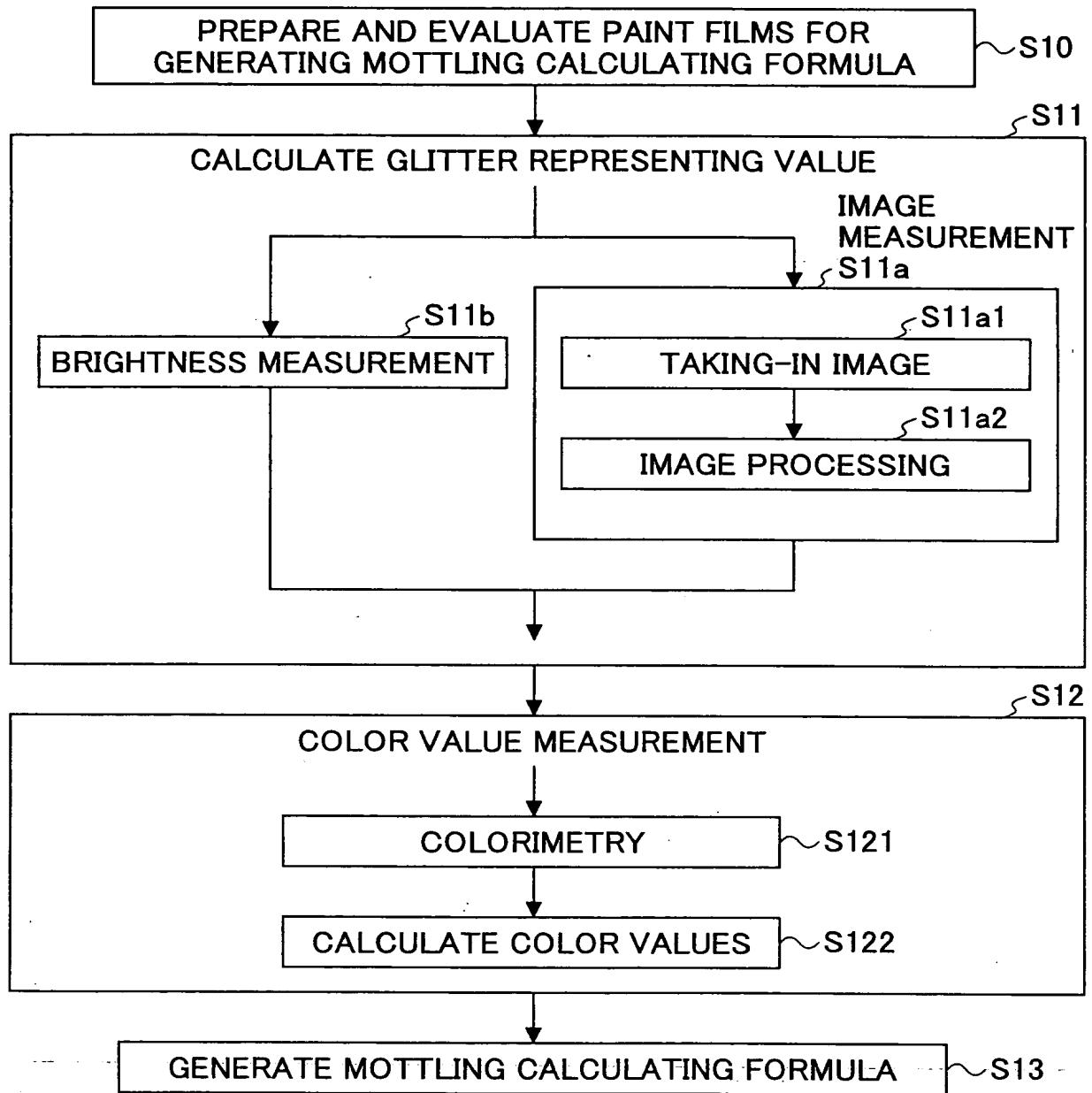


FIG.2

CALCULATION OF HUE ANGLE

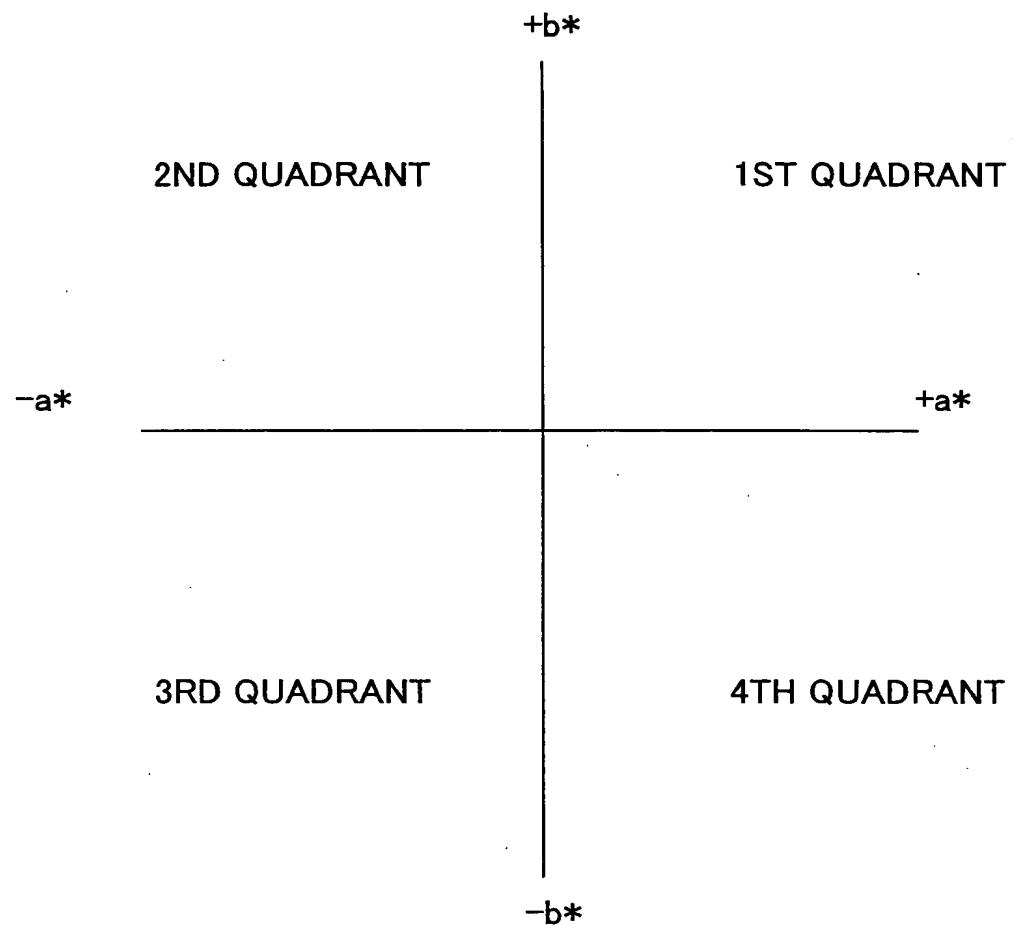


FIG.3

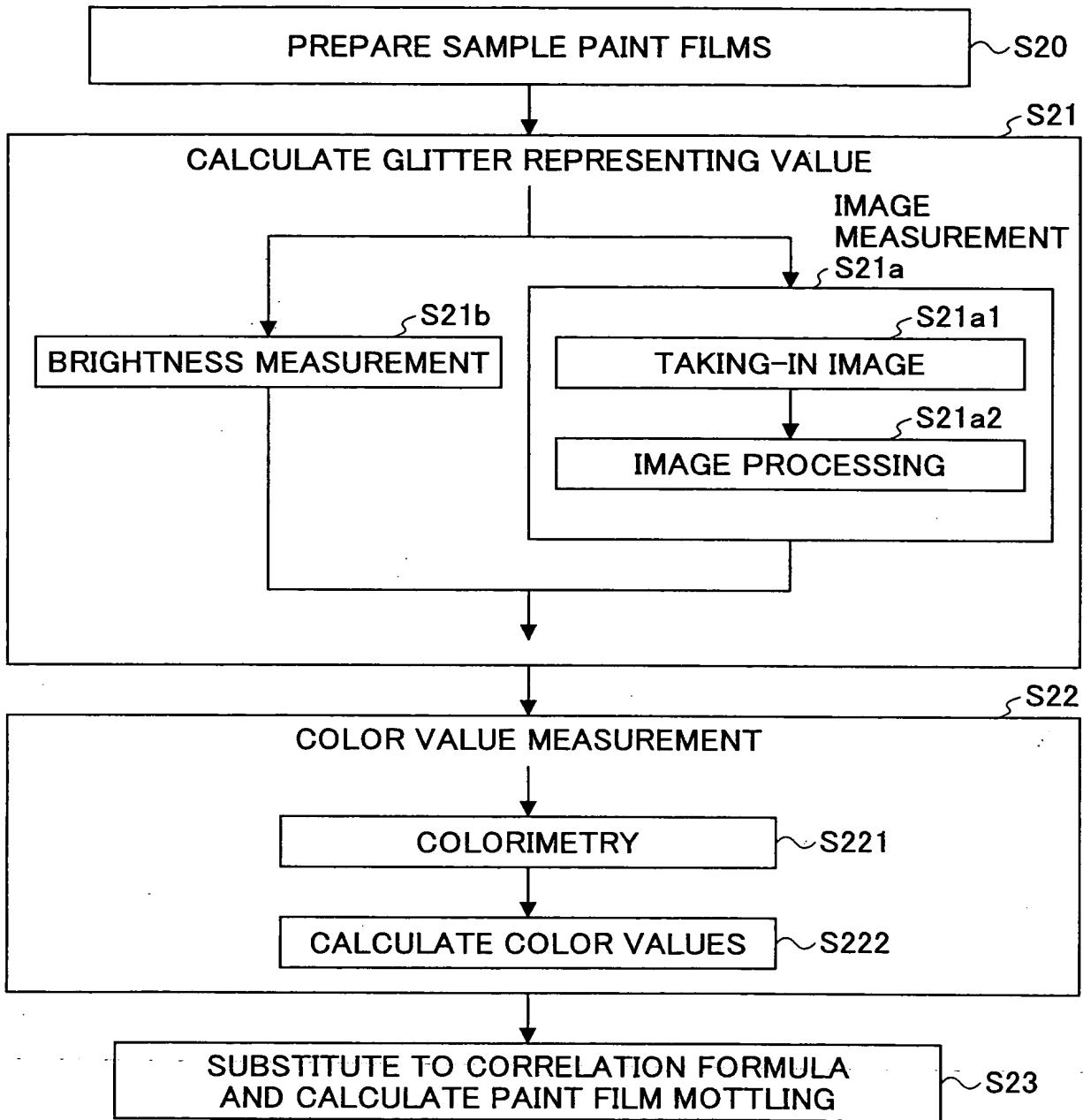


FIG.4

| | AO20001 | AO20002 | AO20005 | AO20007 | AO20008 | AO20009 | AO20010 |
|-----------------------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| ALUMINUM FLAKE PIGMENT A | | 5.7 | | | | | |
| ALUMINUM FLAKE PIGMENT B | 3.2 | | 17.0 | 17.0 | 14.3 | 14.3 | |
| ALUMINUM FLAKE PIGMENT C | 5.5 | 7.7 | | | | | |
| ALUMINUM FLAKE PIGMENT D | | 7.2 | | | | | |
| ALUMINUM FLAKE PIGMENT E | 5.5 | | | | | | |
| CARBON BLACK PIGMENT A | 0.01 | 0.01 | | 0.3 | 0.3 | 0.5 | 0.5 |
| ORGANIC REDDISH PIGMENT A | 0.02 | 0.02 | | | | | |
| INORGANIC REDDISH PIGMENT A | 0.3 | 0.3 | 1.4 | | | | |
| ORGANIC YELLOWISH PIGMENT A | | | 0.05 | | | | |
| ORGANIC YELLOWISH PIGMENT B | | | | 0.6 | | | |
| ORGANIC BLUISH PIGMENT A | | | | | 0.3 | 0.3 | 3.0 |
| TOTAL PWC | 11.33 | 11.23 | 14.95 | 17.6 | 17.8 | 17.8 | 17.8 |

FIG.5

PAINT PROCESS: BASE COATING TWICE WITH 90 SECOND INTERVALA

| | |
|-------------------------------|--------------------------|
| PAINTING MACHINE | ABB 1N1072F |
| PAINT DISCHARGE RATE | 220 cc/min |
| SHAPING AIR | 520 Nm ³ /min |
| ROTATION | 25000 RPM |
| PAINTING MACHINE LINEAR SPEED | 900 mm/min |
| DISTANCE TO PAINTING OBJECT | 300 mm |

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MEASURED VALUE AND CALCIATED VALUE

| | Painted Board ID | A0020023 | A0020024 | A0020025 | A0020026 | A0020027 | A0020028 | A0020029 | A0020030 | A0020031 | A0020032 | A0020033 | A0020034 | A0020035 | A0020036 | A0020037 | A0020038 |
|---------------------|----------------------------|----------|----------|-----------|----------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | Glitter Representing Value | 107 | 73 | 235 | 188 | 119 | 110 | 157 | 99 | 90 | 142 | 111 | 94 | 238 | 236 | 148 | 150 |
| Visual Mottling | MOTTLING | 2.75 | 3.25 | 2 | 2.5 | 3 | 2.75 | 3 | 3.25 | 2.75 | 3.5 | 3.25 | 2 | 2 | 2.75 | 3 | |
| X-Rite 6BM2 | 15° L* | 111.71 | 95.09 | 126.29 | 93.00 | 41.07 | 36.91 | 109.71 | 98.51 | 84.38 | 83.53 | 79.74 | 121.49 | 117.89 | 112.68 | 112.56 | |
| | 15° a* | -4.71 | -4.26 | -8.25 | -37.80 | -27.88 | -24.10 | -5.56 | -4.62 | -4.71 | -28.46 | -24.63 | -23.40 | -8.16 | -7.78 | -5.49 | -5.33 |
| | 15° b* | -2.33 | -1.89 | -2.98 | -31.24 | -20.42 | -19.61 | -2.25 | -1.67 | -1.89 | -23.25 | -21.42 | -21.32 | -3.29 | -2.88 | -2.48 | -2.19 |
| | 25° L* | 93.53 | 83.26 | 94.72 | 68.27 | 28.23 | 25.28 | 89.72 | 92.67 | 85.42 | 67.48 | 70.45 | 69.33 | 93.90 | 91.83 | 90.33 | 89.87 |
| | 25° a* | -4.60 | -4.19 | -6.92 | -29.99 | -20.87 | -17.97 | -5.37 | -4.53 | -4.52 | -25.25 | -23.05 | -21.89 | -7.06 | -6.84 | -5.29 | -5.11 |
| | 25° b* | -1.57 | -1.41 | -2.64 | -25.39 | -16.43 | -15.82 | -1.93 | -1.32 | -1.75 | -20.86 | -20.25 | -20.09 | -2.58 | -2.44 | -1.77 | -1.80 |
| | 45° L* | 61.51 | 60.62 | 45.93 | 31.63 | 10.56 | 9.65 | 58.01 | 60.82 | 59.51 | 40.70 | 47.32 | 48.55 | 49.29 | 49.19 | 54.36 | 55.08 |
| | 45° a* | -3.45 | -3.36 | -3.72 | -14.15 | -7.96 | -6.35 | -3.81 | -3.20 | -3.50 | -16.08 | -17.14 | -16.88 | -4.04 | -4.04 | -3.47 | -3.47 |
| 75° | 45° b* | -1.94 | -1.68 | -2.93 | -17.08 | -10.89 | -10.58 | -2.04 | -1.73 | -1.90 | -16.60 | -17.44 | -17.56 | -2.79 | -2.74 | -1.80 | -2.00 |
| | 75° L* | 36.06 | 39.83 | 22.70 | 12.76 | 3.42 | 3.52 | 35.07 | 36.92 | 38.06 | 22.39 | 28.27 | 30.34 | 23.71 | 23.71 | 32.37 | 32.78 |
| | 75° a* | -3.08 | -3.20 | -3.06 | -5.18 | 0.19 | 0.27 | -3.38 | -2.93 | -3.24 | -9.57 | -11.62 | -11.94 | -3.37 | -3.32 | -3.14 | -3.16 |
| | 75° b* | -2.14 | -1.97 | -3.13 | -12.86 | -4.91 | -5.18 | -2.43 | -2.07 | -2.10 | -13.50 | -14.87 | -15.76 | -3.26 | -3.22 | -2.38 | -2.28 |
| | 110° L* | 26.50 | 29.14 | 16.08 | 7.21 | 2.09 | 2.14 | 26.18 | 27.41 | 28.57 | 14.70 | 19.26 | 21.49 | 17.26 | 16.57 | 24.40 | 24.39 |
| | 110° a* | -3.45 | -3.32 | -3.50 | -2.78 | 1.26 | 1.27 | -3.68 | -3.23 | -3.46 | -7.45 | -9.30 | -9.92 | -3.89 | -3.61 | -3.46 | -3.46 |
| | 110° b* | -2.39 | -2.06 | -3.12 | -11.51 | -2.94 | -3.31 | -2.29 | -2.18 | -2.09 | -12.14 | -13.78 | -14.81 | -3.42 | -3.32 | -2.31 | -2.36 |
| | 15° C VALUE | 5.25 | 4.66 | 8.77 | 49.04 | 34.56 | 31.07 | 6.00 | 4.91 | 5.08 | 36.75 | 32.64 | 31.86 | 8.80 | 8.30 | 6.02 | 5.76 |
| 25° C VALUE | 4.86 | 4.42 | 7.41 | 39.29 | 26.56 | 23.94 | 5.71 | 4.72 | 4.85 | 32.75 | 30.68 | 29.71 | 7.52 | 7.26 | 5.58 | 5.42 | |
| | 3.9580042 | 3.756594 | 4.755325 | 22.17892 | 13.46902 | 12.33932 | 4.32177 | 3.637705 | 3.982462 | 23.11117 | 24.45267 | 24.3575 | 4.909756 | 4.881516 | 3.909079 | 4.005109 | |
| | 75° C VALUE | 3.750467 | 3.757779 | 4.377271 | 13.88405 | 4.913675 | 5.187032 | 4.162848 | 3.587745 | 3.861038 | 16.54796 | 18.87171 | 19.77223 | 4.688763 | 4.655019 | 3.940051 | 3.898665 |
| | 110° C VALUE | 4.196975 | 3.907173 | 4.6868752 | 11.84097 | 3.198625 | 3.545279 | 4.33434 | 3.8986832 | 4.042239 | 14.24367 | 16.82463 | 17.82533 | 5.170624 | 4.904539 | 4.160252 | 4.188222 |
| 15° -100° C VALUE | 1.06 | 0.75 | 4.08 | 37.20 | 31.36 | 27.52 | 1.86 | 1.02 | 1.03 | 22.51 | 16.02 | 13.83 | 3.62 | 3.39 | 1.86 | 1.57 | |
| | 15° HUE ANGLE | 206.32 | 203.93 | 199.86 | 219.57 | 216.22 | 219.14 | 202.03 | 199.87 | 201.86 | 21.925 | 221.01 | 222.34 | 201.96 | 200.31 | 204.31 | 202.34 |
| | 25° HUE ANGLE | 198.60 | 200.88 | 220.25 | 218.21 | 221.36 | 199.77 | 196.25 | 201.16 | 219.56 | 221.30 | 222.54 | 200.07 | 199.63 | 198.50 | 199.40 | |
| | 45° HUE ANGLE | 209.35 | 208.57 | 218.23 | 230.36 | 233.84 | 239.03 | 208.17 | 208.40 | 208.50 | 225.91 | 226.13 | 214.63 | 214.15 | 207.42 | 209.96 | |
| 75° HUE ANGLE | 94.62 | 93.87 | 101.01 | 150.72 | 156.94 | 157.55 | 95.30 | 94.32 | 94.20 | 132.56 | 127.67 | 126.25 | 100.70 | 101.00 | 95.57 | 95.34 | |
| | 110° HUE ANGLE | 214.71 | 211.82 | 221.71 | 256.42 | 293.20 | 290.99 | 211.13 | 214.02 | 238.46 | 235.98 | 236.19 | 221.32 | 222.60 | 213.73 | 214.30 | |
| 15° -100° HUE ANGLE | -8.39 | -7.89 | -21.85 | -36.85 | -76.98 | -71.86 | -9.86 | -14.14 | -9.27 | -19.22 | -13.85 | -19.36 | -22.29 | -9.42 | -11.96 | | |
| | 15° -100° L* VALUE | 85.21 | 65.95 | 110.21 | 85.79 | 38.98 | 34.77 | 82.53 | 82.3 | 69.94 | 64.27 | 58.25 | 104.23 | 101.32 | 88.28 | 88.17 | |

FIG. 7

QSAR ANALYSIS

| | r^2 (CONTRIBUTION RATIO) | r (CORRELATION COEFFICIENT) | CORRELATION FORMULA |
|----|----------------------------------|-------------------------------------|---|
| 1 | 0.774 | 0.885 | 3.35962+0.000474*X1^2+0.11361*<2.25-X1>^2+0.057642*<"X2"-97>-0.064096*<"X2"-90>-0.006376*<103.37-X3>+0.007677*<52.38-X4>^2 |
| 2 | 0.774 | 0.885 | 3.36022+0.000476*X1^2+0.000727*<53.49-X4>^2+0.113511*<2.25-X1>^2+0.057554*<"X2"-97>-0.064014*<"X2"-90>-0.006606*<103.37-X3> |
| 3 | 0.774 | 0.885 | 3.2996+0.013184*X1-0.007534*<95.09-X3>+0.000785*<52.36-X4>^2+0.130979*<2.25-X1>^2-0.065116*<"X2"-90>+0.058619*<"X2"-97> |
| 4 | 0.773 | 0.885 | 3.34463-0.00732*<95.09-X3>+0.00088*<52.36-X4>^2+0.08307*<2.54-X1>^2+0.000443*X1^2+0.077622*<"X2"-95>-0.08417*<"X2"-90> |
| 5 | 0.773 | 0.885 | 3.30917+0.08094*<"X2"-95>-0.012971*X1-0.007545*<95.09-X3>+0.000773*<52.36-X4>^2+0.128525*<2.25-X1>^2-0.087593*<"X2"-90> |
| 6 | 0.770 | 0.883 | 3.34619-0.007719*<95.09-X3>+0.041874*<"X2"-97>-0.048411*<"X2"-88>-0.000446*X1^2+0.08304*<2.54-X1>^2+0.000771*<"X2"-97> |
| 7 | 0.770 | 0.883 | 3.38101+0.000461*X1^2-0.053049*<"X2"-88>-0.008198*<95.47-X3>+0.000855*<59.63-X3>^2+0.139831*<2.05-X1>^2+0.04662*<"X2"-97> |
| 8 | 0.770 | 0.883 | 3.35299+0.000801*<52.36-X4>^2-0.007387*<95.09-X3>+0.042493*<"X2"-97>-0.049023*<"X2"-88>+0.000439*X1^2+0.111768*<2.25-X1>^2 |
| 9 | 0.770 | 0.883 | 3.35271+0.000705*<55.45-X4>^2-0.008205*<95.09-X3>+0.042084*<"X2"-97>-0.048633*<"X2"-88>+0.000441*X1^2+0.111394*<2.25-X1>^2 |
| 10 | 0.774 | 0.885 | 3.34303+0.000757*<53.49-X4>^2+0.117817*<2.25-X1>^2+0.058131*<"X2"-97>-0.064606*<"X2"-90>-0.007873*<95.09-X3>+0.013639*<"X1"-3.99> |

| | |
|----------------------------|----|
| 45° CHROMA SATURATION | X1 |
| GLITTER REPRESENTING VALUE | X2 |
| 15° L* | X3 |
| BRIGHTNESS FF | X4 |
| HUE ANGLE FF | X5 |
| CHROMA SATURATION FF | X6 |
| 45° HUE ANGLE | X7 |
| VISUAL MOTTLING VALUE | y |

FIG. 8

CORRELATION OF VISUAL MOTTLING—CALCULATED MOTTLING

